

WHAT IS CLAIMED IS:

1           1. A method for accessing files in a file server comprising:  
2           receiving a file request in connection with a file;  
3           performing one or more first operations on a first file system in response to the  
4           file request, wherein the one or more first file operations are performed on a copy of the file  
5           contained in the first file system; and

6           selectively performing one or more second operations on a second file system  
7           different from the first file system in response to the file request, wherein the one or more  
8           second operations are performed on a copy of the file contained in the second file system,  
9           wherein client systems can access files on the first file system only via the file  
10          server,

11           wherein client systems can access files on the second file system directly,  
12          absent the file server.

1           2. The method of claim 1 wherein each file contained in the second file  
2          system comprises sequentially allocated blocks.

1           3. The method of claim 1 wherein a format of the first file system is  
2          different from a format of the second file system.

1           4. The method of claim 3 wherein the format of the first file system is not  
2          a publicly known format and the format of the second file system is a publicly known format.

1           5. The method of claim 4 wherein each file contained in the second file  
2          system comprises one or more blocks of physical storage allocated in sequential order.

1           6. The method of claim 1 wherein the step of performing one or more  
2          second operations is performed if the file request includes a write-type operation on the file.

1           7. The method of claim 6 wherein the step of performing one or more  
2          second operations is performed only after completing the step of performing one or more first  
3          operations.

1           8. The method of claim 6 wherein the step of performing one or more  
2          second operations is queued up in a list of operations to be performed on the  
3          second file system, wherein the list of operations comprise operations from previous file

4 requests, wherein the one or more first operations are performed asynchronously with respect  
5 to the one or more second operations.

1                 9.         The method of claim 1 wherein the step of performing one or more  
2 second operations is performed if the file request is a file close operation.

1                 10.       A method for accessing files on a file server comprising:  
2                     receiving a request for a first operation on a file, the request including a file  
3 reference;

4                     performing the first operation on a first file in a first file system, the first file  
5 being identified by the file reference;

6                     storing information representative of the first operation and of the file  
7 reference in an entry of a queue; and

8                     for each entry in the queue, performing a second operation responsive to  
9 information contained in the entry, wherein the second operation is performed on a second  
10 file in a second file system, the second file being identified by the information contained in  
11 the entry, wherein the second file system is different from the first file system.

1                 11.       The method of claim 10 wherein the second operation is performed if  
2 the operation represented by the information in the entry is a write-type operation.

1                 12.       The method of claim 11 wherein the second operation that is  
2 performed is the same as the first operation.

1                 13.       The method of claim 10 wherein the second operation is a copy  
2 operation to produce the second file by making a copy of the first file, if the operation  
3 represented by the information in the entry is a file close operation.

1                 14.       The method of claim 13 wherein the copy operation produces multiple  
2 versions of the first file, in the second file system.

1                 15.       The method of claim 14 wherein files in the second file system  
2 comprise sequentially allocated blocks of a physical storage medium.

1                 16.       The method of claim 10 wherein the step of performing the operation  
2 on a first file is performed by a first process in the file server, and processing of entries in the

3 queue is performed by a second process in the file server, wherein operations on the first file  
4 system are performed asynchronously with respect to operations on the second file system.

1           17. A method for operating a file server comprising:  
2           receiving a file request;  
3           communicating one or more first file operations to a first file system to  
4 perform the file request on a file in the first file system, the file being identified in the file  
5 request;  
6           determining if the file request is a write-type of request; and  
7           if a determination is made that the file request is a write-type of request, then  
8 communicating one or more second file operations to a second file system to perform the file  
9 request on a file in the second file system, the file being identified in the file request, this step  
10 of communicating being performed after the file request on the first file system has  
11 completed.

1           18. The method of claim 17 wherein a format of the first file system is  
2 different from a format of the second file system.

1           19. The method of claim 18 wherein the format of the first file system is  
2 not a publicly known format and the format of the second file system is a publicly known  
3 format.

1           20. A method for accessing files in a file server comprising:  
2           providing a first file system and a second file system, the second file system  
3 comprising files contained in the first file system, the first file system having a file system  
4 format that is different from a file system format of the second file system;  
5           receiving a file request;  
6           responsive to the file request, performing one or more first operations on a file  
7 stored in the first file system; and  
8           if the file request is a close file operation, then producing a copy of the file in  
9 the first file system, the copy being stored in the second file system.

1           21. The method of claim 20 wherein if a previous copy of the file in the  
2 first file system is stored in the second file system, then the step of producing a copy includes  
3 preserving the previous copy, whereby multiple copies of the file in the first file system are  
4 accumulated in the second file system.

1                   22.     The method of claim 20 wherein the file system format of the first file  
2 system is not a publicly known format and the file system format of the second file system is  
3 a publicly known format.

1                   23.     A file server comprising:  
2                   a data processing component;  
3                   a communication component configured to receive file requests; and  
4                   a physical storage component in data communication with the data processing  
5 component comprising a first physical storage portion and a second physical storage portion,  
6                   the first physical storage portion containing files organized in a first file  
7 system,  
8                   the second physical storage portion containing files organized in a second file  
9 system, the first file system having a format different from the second file system, wherein  
10 the second file system comprises one or more files contained in the first file system,  
11                   the data processing component comprising first file system software for  
12 accessing the first file system and second file system software for accessing the second file  
13 system,  
14                   the data processing component configured to perform first file requests made  
15 on the first file system and to perform at least some of the first file requests on the second file  
16 system.

1                   24.     The file server of claim 23 wherein files stored in the second file  
2 system include multiple versions of one or more files stored in the first file system.

1                   25.     The file server of claim 24 wherein each file stored in the second file  
2 system comprises blocks of a physical storage device that are sequential in allocation order.

1                   26.     The file server of claim 23 wherein the first file system is not a  
2 publicly known format and the second file system is a publicly known format.

1                   27.     The file server of claim 23 wherein file requests performed on the  
2 second file system are write-type file requests.

1                   28.     A network attached storage (NAS) gateway configured in accordance  
2 with the file server of claim 23.

1                   29.     The NAS gateway of claim 28 further comprising a storage area  
2 network (SAN), the physical storage component comprising a portion of the SAN, the NAS  
3 gateway configured to communicate over the SAN to access the physical storage component.

1                   30.     The NAS gateway of claim 28 further comprising an interface to the  
2 second file system configured for communication with a SAN, wherein access to the second  
3 file system can be made via the SAN.

1                   31.     The NAS gateway of claim 28 further comprising an interface  
2 configured for communication with a SAN, wherein some of the first file requests performed  
3 on the second file system are made via the SAN.

1                   32.     The NAS gateway of claim 31 wherein an application server can  
2 access the second file system via the SAN.

1                   33.     An application server comprising:  
2                       a data processing component for executing one or more applications;  
3                       file access software configured to access a first file system and a second file  
4                       system that is different from the first file system; and  
5                       a physical storage component comprising first physical storage for files  
6                       contained in the first file system, the physical storage component further comprising second  
7                       physical storage for files contained in the second file system,  
8                       wherein the file access software receives file requests from the one or more  
9                       applications and performs the file requests on the first file system, and selectively performs  
10                  the file requests on the second file system.

1                   34.     The server of claim 33 wherein the physical storage component is  
2 provided via a SAN.

1                   35.     The server of claim 33 wherein the file requests are performed on the  
2 second file system for write-type file requests.

1                   36.     The server of claim 33 wherein the write-type file requests include a  
2 modification to a file, a deletion of a file, creation of a file, changing one or more file  
3 attributes, modification of one or more directory attributes, creation of a directory, and  
4 deletion of a directory.

1           37. A file server comprising:  
2           means for receiving file requests;  
3           means for performing the file requests on a first file system, including means  
4           for communicating with the first file system; and  
5           means for selectively performing the file requests on a second file system,  
6           including means for communicating with the second file system, the second file system  
7           having a format different from the first file system.

1           38. The file server of claim 37 wherein the means for selectively  
2           performing the file requests includes performing the file requests that are write-type file  
3           requests.

1           39. An application server comprising data processing means for execution  
2           one or more applications, the applications producing one or more file requests; and file server  
3           means according to claim 37 for performing file requests received from the one or more  
4           applications.